

What is claimed is:

1. An apparatus for treating sewage by using granulated activated sludge, comprising:

5 an anaerobic granulation tank having an agitator for granulating suspended microorganisms with irrigation force of influent sewage or returned water and agitation power by an agitator to thereby generate sludge;

10 a first transport pipe for transporting supernatant of the anaerobic granulation tank except the sludge granulated in the anaerobic granulation tank;

an indirect aeration tank for supplying oxygen to the supernatant transported through the first transport pipe;

15 a second transport pipe for transporting aqueous solution saturated with dissolved oxygen by receiving oxygen in the indirect aeration tank;

20 an aerobic granulation tank for granulating suspended microorganisms with irrigation force of the aqueous solution transported through the second transport pipe and agitation power by an agitator, the aerobic granulation tank including the agitator;

25 a third transport pipe for transporting supernatant of the aerobic granulation tank to the anaerobic granulation tank except the sludge granulated in the aerobic granulation tank; and

a discharge pipe for discharging supernatant of finished water which is obtained after circulating a series of the

anaerobic granulation tank, the first transport pipe, the indirect aeration tank, the second transport pipe, the aerobic granulation tank, and the third transport pipe repeatedly.

5       2. The apparatus as recited in claim 1, wherein the  
first transport pipe connects the upper part of the anaerobic  
granulation tank with the lower part of the indirect aeration  
tank, and the second transport pipe connects the lower part of  
the indirect aeration tank with the lower part of the aerobic  
10      granulation tank, and the third transport pipe connects the  
upper part of the aerobic granulation tank with the lower part  
of the anaerobic granulation tank.

15      3. The apparatus as recited in claim 2, wherein the  
third transport pipe is connected with a pump for controlling  
a flow rate of the supernatant of the aerobic granulation tank  
which returns to the anaerobic granulation tank.

20      4. The apparatus as recited in claim 1, wherein the  
anaerobic granulation tank further includes a first pump for  
controlling a flow rate of the influent sewage that flows in  
into the anaerobic granulation tank.

25      5. The apparatus as recited in claim 1, wherein the  
indirect aeration tank is connected with an oxygen supply  
device for providing oxygen to the indirect aeration tank.

6. A method for treating sewage by using granulated activated sludge, comprising the steps of:

a) agitating influent sewage that flows in through the lower part of an anaerobic granulation tank or returned water 5 with an agitator to granulate suspended microorganisms, to thereby form a first granulated sludge in the anaerobic granulation tank;

b) transporting supernatant of the anaerobic granulation tank to an indirect aeration tank through a first transport 10 pipe, except the first granulated sludge in the anaerobic granulation tank;

c) supplying oxygen to the supernatant transported to the indirect aeration tank;

d) transporting aqueous solution saturated with dissolved oxygen by receiving oxygen in the indirect aeration 15 tank to the lower part of an aerobic granulation tank through a second transport pipe;

e) agitating the aqueous solution transported to the aerobic granulation tank with an agitator to granulate 20 suspended microorganisms, to thereby form a second granulated sludge in the aerobic granulation tank;

f) transporting supernatant of the aerobic granulation tank to the anaerobic granulation tank through a third transport pipe, except the second granulated sludge in the 25 aerobic granulation tank; and

g) discharging supernatant of finished water which is obtained after circulating a series of the anaerobic

granulation tank, the first transport pipe, the indirect aeration tank, the second transport pipe, the aerobic granulation tank and the third transport pipe repeatedly through a discharge pipe.

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7. The method as recited in claim 6, wherein water flow is induced based on gravity by forming the first transport pipe to connect the upper part of the anaerobic granulation tank with the lower part of the indirect aeration tank, the second transport pipe to connect the lower part of the indirect aeration tank with the lower part of the aerobic granulation tank, and the third transport pipe to connect the upper part of the aerobic granulation tank with the lower part of the anaerobic granulation tank.

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8. The method as recited in claim 6, wherein the third transport pipe is connected with a first pump and controls a flow rate of the supernatant of the aerobic granulation tank that returns to the anaerobic granulation tank by using the first pump.

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25 9. The as recited in claim 6, wherein a flow rate of the influent sewage that flows in through the lower part of the anaerobic granulation tank is controlled by using a second pump.